

Claims

1. A method of operating a plurality of ignition coils in a multi-cylinder internal combustion engine comprising the steps of:
 - (A) initiating combustion in a first cylinder using a first one of the ignition coils;
 - 5 (B) generating on a common communication line combined with a first sync signal a first combustion signal indicative of combustion in the first cylinder;
 - (C) initiating combustion in a second cylinder using a second one of the ignition coils;
 - 10 (D) generating on said common communication line a second combustion signal associated with said second cylinder combined with a second sync signal to thereby multiplex said first and second combustion signals on said common communication line.
2. The method of claim 1 further including the steps of:
 - generating a first current flag signal when a primary current through the first one of the ignition coils meets predetermined criteria; and
 - producing said first sync signal in accordance with said first
 - 5 current flag signal.
3. The method of claim 2 further including the steps of:
 - generating a second current flag signal when a primary current through the second one of the ignition coils meets predetermined criteria; and
 - producing said second sync signal in accordance with said
 - 5 second current flag signal.
4. The method of claim 3 wherein the engine has a cylinder firing sequence associated therewith, the second ignition coil being associated with the second cylinder that is next in the firing sequence after the first cylinder.

5. The method of claim 3 wherein the predetermined criteria comprises a charging current trip level.

6. The method of claim 3 wherein said generating steps each comprise the substeps of:

generating the respective current flag signal in a first state;

5 transitioning the respective current flag signal from the first state to a second state along a first edge when the primary current increases to the charging current trip level; and

returning the respective current flag signal from the second state to the first state along a second edge.

7. The method of claim 6 further comprising the step of electrically connecting a respective output from each one of the ignition coils for carrying respective current flag and combustion signals.

8. The method of claim 7 wherein said combustion signal is one selected from the group comprising an ion sense signal and a cylinder pressure signal.

9. The method of claim 1 further including the step of:

selecting the electronic spark timing (EST) signals for the first and second ignition coils as the first and second sync signals.

10. The method of claim 6 further including the step of:

producing the first sync signal as a pulse having a first edge synchronized to an initial edge of the first current flag signal, the pulse having a second edge synchronized with the end of an end-of-spark ring out delay.

11. The method of claim 6 further including the step of:

producing the first sync signal as a pair of pulses wherein a first one of the pulses has an edge synchronized to an initial edge of the first current flag signal, the other one of the pulses having a trailing edge synchronized with the end of
5 an end-of-spark ring out delay.

12. A method of operating a plurality of ignition coils in a multi-cylinder internal combustion engine comprising the steps of:

- (A) initiating combustion in a first cylinder using a first one of the ignition coils;
- 5 (B) generating a first current flag signal when a primary current through the first one of the ignition coils meets predetermined criteria;
- (C) producing a first sync signal in accordance with said first current flag signal;
- (D) generating, on a common communication line, a first
10 combustion signal indicative of combustion in the first cylinder combined with the first sync signal;
- (E) initiating combustion in a second cylinder using a second one of the ignition coils;
- (F) generating a second current flag signal when a primary current
15 through the second one of the ignition coils meets predetermined criteria;
- (G) producing a second sync signal in accordance with said second current flag signal;
- (H) generating, on said communication line, a second combustion signal associated with said second cylinder combined with a second sync signal to
20 thereby multiplex said first and second combustions signals on said common communication line; and
- (I) processing the first and second combustion signals in sequence.